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Insects Collected in the Dundas Marsh, Hamilton, Ontario, 1946-47, with Observations on Their Periods of Emergence[1]

By W. W. JUDD[2]

Introduction

During the summer of 1947 a project was initiated with the object of determining the earliest and latest dates of appearance and the period of appearance of maximum numbers of the various species of insects which emerge as adults from the Dundas Marsh, Hamilton, Ontario. Previous to this, during the summer of 1946, observations were made on the occurrence of various insects on the marsh. Such observations were continued during 1947 and are reported herewith.

Description of Region

The Dundas Marsh, lying along the northern limits of the city of Hamilton, is a region of about 700 acres in extent (see map, fig. 1). During the past it has received a variety of names. Father Hennepin, missionary and explorer, visited the region early in the seventeenth century and named it "Little Flanders" (Burkholder, 1938). It was later named "Coote's Paradise" after a Captain Coote, of the garrison at York, who hunted waterfowl in the marsh. The name "Jubilee Sanctuary" was applied to the marsh to commemorate the jubilee year of King George V in 1935.

The marsh lies in a valley below the Niagara Escarpment where the latter runs north-eastward from the town of Dundas, and its waters are fed by several streams which flow over the escarpment. In its original condition the marsh emptied into Hamilton Bay by an outlet at its north-eastern end. In 1827 the construction of the Desjardins Canal (see map, fig. 1) was begun and it was opened for traffic in 1837. The canal extends eastward from a turning basin in the town of Dundas for a distance of about three miles and has access to Hamilton Bay

[1]Contribution from the Department of Zoology, McMaster University; a project supported by funds from the government of Ontario on the recommendation of the Advisory Committee on Fisheries and Wildlife of the Ontario Research Commission.

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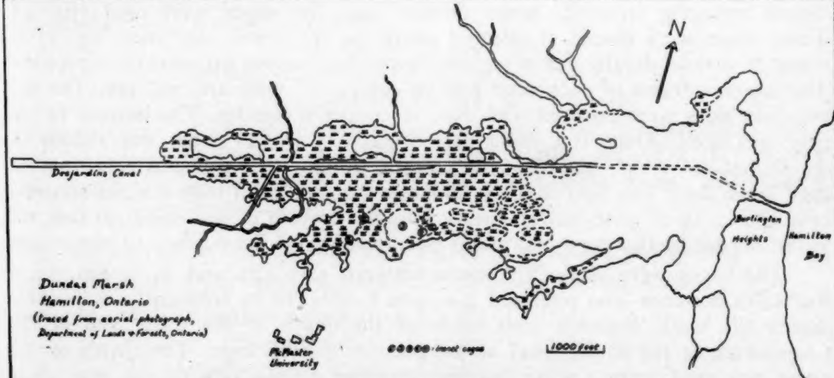

FIGURE I.

by a cut through Burlington Heights which separates the marsh from the bay. With the increase in importance of Hamilton as a port in the latter part of the nineteenth century the Desjardins Canal fell into disuse and today is navigable only by canoe or by small boats.

At the eastern end of the marsh is open water comprising about one-quarter of the total area of the marsh. The remainder of the area supports a heavy growth of aquatic and marsh-dwelling plants. The predominant plant in the central part of the marsh is the Old World Manna Grass, *Glyceria maxima* (Hartm.) Holmb. (Dore, 1947). *Typha latifolia* L. also forms predominant stands throughout the marsh. Various submerged plants grow in quiet stretches of water extending westward from the open water.

FIGURE 2. Cage 5 from southeast on July 24, 1947 (water level—54")

Methods

Collections of insects were made by patrolling the shores of the marsh and sweeping the vegetation with a net. Collections over deep water were made from a canoe. Insects in flight were netted when possible and the emergent leaves of aquatic plants were examined for the presence of insects.

To carry out the study of the times of appearance of the various species of insects emerging from the water during 1947, five cages were used (fig. 2). These cages were placed at selected points on the marsh (see map, fig. 1) in water of various depths and in regions supporting various growths of vegetation. The wooden frame of each cage was 36" long, 30" wide and 36" tall. The top and four sides were covered with No. 16 copper screening. The bottom of the cage was open. Along the upper part of each of the 36" sides was a door of dimensions 32" x 15", hinged at the bottom, to allow the collector access to the cage. Each door was held shut by hooks at the top. Each cage was set securely over four 2" x 2" posts driven firmly into the bottom of the marsh so that the lower border of the cage was about one foot below the surface of the water.

The cages were visited by canoe between 9.30 a.m. and 11.30 a.m. (in a few cases between 2.00 p.m. and 4.00 p.m.) daily, or as frequently as possible during the week. Records were made of the depth of the water and of the temperature at the surface and at the bottom at each cage. The depth of the water was read from a scale (inches) attached to the side of the cage. The temperature of the water at the surface was taken with a Centigrade thermometer. The temperature of the water at the bottom was taken with a Negretti and Zambra reversing thermometer (0 deg.—25 deg. C).

After the depth and temperatures of the water at a cage had been recorded the insects were collected from the cage. The canoe was drawn up alongside the cage, and one of the doors was opened. Large insects (dragon flies, damsel flies, etc.) were captured by hand and were put in a cyanide jar. Small insects (midges, etc.) were sucked into a jar by means of an aspirator and then transferred to a cyanide jar. Dead insects lying on the surface of the water were scooped up with a small strainer and were placed in preservative. Collections from the different cages were kept separate. The collecting of insects was continued till Nov. 3 when the cages were removed and stored for the winter.

On return to the laboratory representative specimens were pinned and labelled (date, name of collector, number of cage) and the remaining specimens were placed in preservative in shell vials, specimens from each of the five cages being kept separate. All specimens, pinned and preserved, are retained in collections at McMaster University except series kept by specialists who have examined the insects. The number of specimens of each species in a daily catch, from each cage, was determined and recorded. The number of specimens of each species trapped in all cages daily was also determined and recorded.

Data on Cages

Cage I: set out on April 17, 1947 twenty feet from shore in a growth of *Typha latifolia.*

Depth of water: April 17—20 inches; maximum—36 inches, June 27.

Temperature: bottom—minimum— 6.0 deg. C—April 28
—maximum—23.0 deg. C—June 30
surface—minimum— 6.0 deg. C—April 28
—maximum—26.0 deg. C—June 23

Plants in cage: *Typha latifolia* L. (predominant), *Myriophyllum verticillatum* L. (predominant), *Spirodela polyrhiza* (L.) Scheld., *Lemna minor* L., *Wolffia columbiana* Karst., *Ceratophyllum demersum* L., *Anacharis canadensis* (Michx.) Planchon, *Ricciocarpus natans* (L.) Corda.

Cage II: set out on May 3, 1947 over a growth of submerged plants.

Depth of water: May 3—24 inches; maximum—42 inches, July 8.

Temperature: bottom—minimum— 5.7 deg. C—May 8
—maximum—22.7 deg. C—July 2
surface—minimum— 7.0 deg. C—May 8
—maximum—29.2 deg. C—Aug. 14

Plants in cage: *Utricularia vulgaris* var. *americana* Gray (predominant), *Myriophyllum verticillatum* L., *Spirodela polyrhiza* (L.) Scheld., *Lemna minor* L., *Wolffia columbiana* Karst., *Ricciocarpus natans* (L.) Corda.

Cage III: set out on May 3, 1947 over a growth of submerged plants.

Depth of water: May 3—36 inches; maximum—54 inches, June 13.

Temperature: bottom—minimum— 8.7 deg. C—Nov. 1
—maximum—22.8 deg. C—July 18
surface—minimum— 8.6 deg. C—Nov. 1
—maximum—27.5 deg. C—July 14

Plants in cage: *Ceratophyllum demersum* L. (predominant), *Spirodela polyrhiza* (L.) Scheld., *Lemna minor* L., *Wolffia columbiana* Karst.

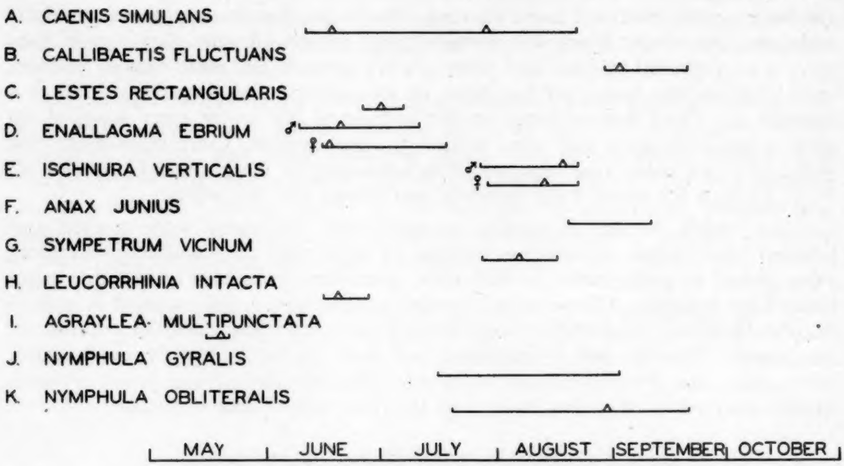

FIGURE 3. TIME OF EMERGENCE OF ADULTS △: TIME OF MAXIMUM EMERGENCE

Cage IV: set out on June 12, 1947 over a growth of water lily and submerged plants.

Depth of water: June 12—60 inches; maximum—60 inches, June 12.

Temperature: bottom—minimum— 9.0 deg. C—Nov. 1
—maximum—23.0 deg. C—July 18
surface—minimum— 8.0 deg. C—Nov. 1
—maximum—28.8 deg. C—July 14

Plants in cage: *Nymphaea odorata* Ait. (predominant), *Potamogeton pectinatus* L., *Ceratophyllum demersum* L., *Spirodela polyrhiza* (L.) Scheld., *Lemna minor* L., *Wolffia columbiana* Karst.

Cage V: set out on June 12, 1947 over a growth of submerged plants.

Depth of water: June 12—57 inches; maximum—58 inches, June 18.

Temperature: bottom—minimum— 8.7 deg. C—Nov. 1
—maximum—23.8 deg. C—Aug. 15
surface—minimum— 8.9 deg. C—Nov. 1
—maximum—29.0 deg. C—July 14

Plants in cage: *Ceratophyllum demersum* L. (predominant), *Potamogeton pectinatus* L., *Spirodela polyrhiza* (L.) Scheld., *Lemna minor* L., *Wolffia columbiana* Karst., *Ricciocarpus natans* (L.) Corda.

Insects Collected

Collembola

Arthropleona

Poduridae

Podura aquatica L.

Springing actively on the surface of the water and on collapsed vegetation about the borders of the marsh, April 21, 1947.

Entomobryidae

Isotomurus palustris (Muller)

On surface of water in company with *Podura aquatica*, April 21, 1947.

Symphypleona

Sminthuridae

Bourletiella spinata (MacG.)

Springing actively on the surface of the water and clustered on the lower parts of leaves of *Typha latifolia*, June 5, 1947.

Plecoptera

Capniidae

Allocapnia pygmaea (Burmeister)

Two specimens, one brachypterous, were collected by Mr. K. Broman, Royal Botanical Gardens, from a "large mass", February 25, 1947. The insects were reported to be milling about on the surface of the ice and flying about above it. Several couples were mating in flight and on the ice.

Ephemerida

Baetidae

Caenis simulans McDunnough

Trapped in cages (437): earliest emergence—June 12, latest emergence—Aug. 23, maximum emergence—June 19 (45) and July 30 (35). (fig. 3A).

Callibaetis fluctuans Walsh

Trapped in cages (33): earliest emergence—Aug. 30, latest emergence—Sept. 21, maximum emergence (5)—Sept. 3, 1947. (fig. 3B).

Baetis pygmaeus Hagen

Single specimen trapped in cage 3, Oct. 18, 1947.

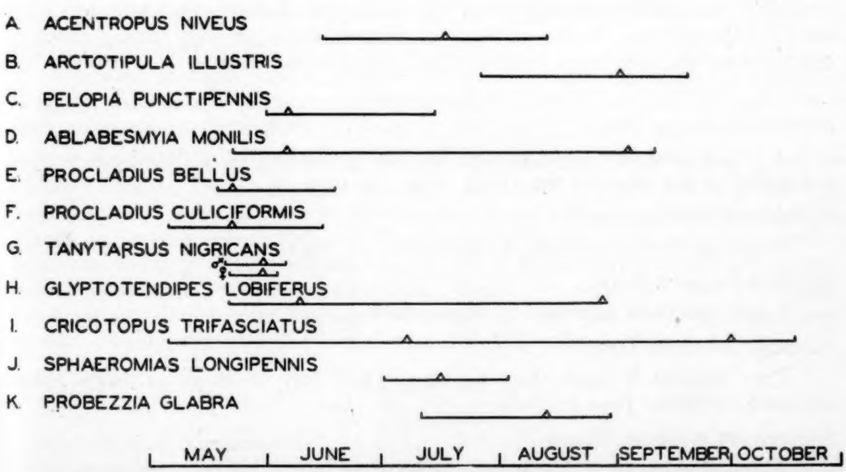

FIGURE 4. TIME OF EMERGENCE OF ADULTS △: TIME OF MAXIMUM EMERGENCE

Odonata

Zygoptera

Lestidae

Lestes rectangularis Say

Trapped in cages (9): earliest emergence—June 27, latest emergence—July 8, maximum emergence (3)—July 2, 1947. (fig. 3C).

Coenagriidae

Enallagma ebrium (Hagen)

Trapped in cages: males (69): earliest emergence—June 9, latest emergence —July 11, maximum emergence (8)—June 20, 1947; females (49): earliest emergence—June 16, latest emergence—July 19, maximum emergence (9)—June 18, 1947. (fig. 3D).

All adults trapped in cages were of the light teneral colouration. Bright blue males were seen or captured only in flight. The males emerged first about a week ahead of the females (Miller, 1941).

Ischnura verticalis (Say)

Trapped in cages: males (11): earliest emergence—July 28, latest emergence —Aug. 23, maximum emergence (2)—Aug. 19, 1947, (a single male was captured, June 25); females (8): earliest emergence—July 30, latest emergence—Aug. 23, maximum emergence (2)—Aug. 14, 1947. (fig. 3E).

All females trapped in cages were of the orange heterochromatic colouration. Bluish, pruinose females were seen only in flight.

Anisoptera

Aeschnidae

Anax junius (Drury)

Trapped in cages (5): earliest emergence—Aug. 20, latest emergence—Sept. 11, 1947. (fig. 3F).

All specimens trapped were of the teneral colouration, with greenish thorax and purple abdomen. A single specimen, seen in flight on April 3, 1947, was probably a migrant returning from the south (Walker, 1941). On warm days during October 1947 flights of forty to fifty adults were seen milling about in the air over the McMaster campus which borders the marsh.

Libellulidae

Perithemis tenera (Say)

A single specimen was captured by Mr. E. Turner on a flowering head of goldenrod at the edge of the marsh, Aug. 14, 1946.

Libellula quadrimaculata L.

Single specimen captured in flight, June 26, 1946.

Libellula luctuosa Burm.

Single specimen captured in flight, July 5, 1946.

Libellula pulchella Drury

Two trapped in cages: July 2 (cage 1) and July 16 (cage 4), 1947. Three captured in flight: June 27, July 5, July 26, 1946.

Sympetrum vicinum (Hagen)

Trapped in cages (11): earliest emergence—July 28, latest emergence—Aug. 18, maximum emergence (5)—Aug. 6, 1947. (fig. 3G).

All specimens trapped were of the yellowish brown teneral colouration.

Leucorrhinia intacta Hagen

Trapped in cages (18): earliest emergence—June 16, latest emergence—June 28, maximum emergence (3)—June 20, 1947. (fig. 3H).

All specimens trapped were of the light teneral colouration.

Pachydiplax longipennis (Burm.)

Two trapped in cages: Aug. 23 (cage 1), Aug. 25 (cage 4), 1947.

Tramea lacerata Hagen

Three trapped in cages: Aug. 30 (cage 4), Sept. 6 (cages 2, 3), 1947. One caught in flight July 6, 1946.

Trichoptera

Hydroptilidae

Agraylea multipunctata Curtis

Trapped in cages (9): earliest emergence—May 16, latest emergence—May 22, maximum emergence (2)—May 20, 1947. (fig. 3I).

Leptoceridae

Leptocerus americanus (Banks)

Single specimen trapped in cage 4, June 27, 1947.

Lepidoptera

Pyralidae

Nymphula icciusalis Walker

Single specimen trapped in cage 1, June 27, 1947. Specimen caught in flight Aug. 14, 1947.

Nymphula gyralis Hlst.

Trapped in cages (4): earliest emergence—July 16, latest emergence—Sept. 3. Several caught in flight—Aug. 14, 15, 1947. (fig. 3J).

Nymphula obliteralis Walker

Trapped in cages (11): earliest emergence—July 19, latest emergence—Sept. 21, maximum emergence (2)—Aug. 30, 1947. (fig. 3K).

Acentropus niveus Olivier

Trapped in cages (201): earliest emergence—June 16, latest emergence—Aug. 15, maximum emergence (28)—July 19, 1947. (fig. 4A). Three specimens were captured in flight June 14, 1947 (Judd, 1947).

Acentropus niveus is a moth of common occurrence in marshy regions in Europe. Munroe (1947) discusses its status in North America and expresses the opinion that it is likely a native of America. In the collection from the Dundas Marsh 204 moths were captured between June 14 and Aug. 15, 1947 with a maximum number (28) emerging on July 19. It is thus evident that the species is well established in the Dundas Marsh. There is a possibility that this insect has been introduced from Europe in view of the fact that the Desjardins Canal carried considerable shipping in the past, but this is by no means certain.

Homoptera

Aphidae

Rhopalosiphum nympheae L.

Occurred in myriads on the leaves of *Nymphaea odorata*. Alate and apterous specimens were collected on July 18 and 22 and apterous specimens on Oct. 18, 1947.

Coleoptera

Chrysomelidae

Galerucella nympheae (L.)

Collected in large numbers from leaves of *Polygonum natans* Eaton, July 16, 1947.

Disonycha uniguttata Say

Collected in large numbers from leaves of *Polygonum natans* Eaton, July 16, 1947.

Donacia (*Plateumaris*) *sulcicollis* Lac.

Captured in flight, June 6, and on leaves of *Nymphaea odorata*, Aug. 4, 1947.

Donacia (*Donacia*) *subtilis* Kunze

Captured in flight, June 6, and on leaves of *Nymphaea odorata*, Aug. 4, 1947.

Coccinellidae

Coleomegilla maculata (DeGeer)

Hippodamia 13-punctata (L.)

Captured on leaves of *Nymphaea odorata* July 14 and 24, 1947. Larvae and pupae were abundant on the lily pads during August, 1947. Adults and larvae were predators of the aphid *Rhopalosiphum nympheae* L.

Diptera

Tipulidae

Arctotipula illustris Doane

Trapped in cages (26): earliest emergence—July 28, latest emergence—Sept. 21, maximum emergence (3)—Sept. 3 (fig. 4B).

Ormosia innocens Osten Sacken

Single specimen captured by sweeping at edge of marsh, May 13, 1947.

Tendipedidae (Chironomidae)

(subfamilies as in Townes, 1945)

Pelopiinae

Pelopia punctipennis Meigen

Trapped in cages (138): earliest emergence—June 1, latest emergence—July 16, maximum emergence (22)—June 7, 1947. (fig. 4C).

Ablabesmyia monilis L.

Trapped in cages (294): earliest emergence—May 23, latest emergence—Sept. 11, maximum emergence (10, 10)—June 6, 7 and (11)—Sept. 4, 1947. (fig. 4D).

Procladius bellus Loew

Trapped in cages (9): earliest emergence—May 19, latest emergence—June 19, maximum emergence (5)—May 23, 1947. (fig. 4E).

Procladius culiciformis L.

Trapped in cages (7): earliest emergence—May 6, latest emergence—June 16, maximum emergence (2)—May 23, 1947. (fig. 4F).

Tendipedinae

Tanytarsus nigricans (Johannsen)

Trapped in cages: males (7): earliest emergence—May 21, latest emergence —June 6, maximum emergence (2)—May 31, 1947 (fig. 4G); females (7): earliest emergence—May 22, latest emergence—June 4, maximum emergence (2)—May 31, 1947 (fig. 4G).

Tendipes tentans (Fabr.)

Three captured in flight, June 11, 1947.

Glyptotendipes atrimanus (Coq.)

One specimen trapped in cage 3, June 9, 1947. Three captured in flight, Aug. 10, Aug. 12, Oct. 2, 1947.

Glyptotendipes paripes (Edwards)

Two trapped in cage 3, May 6, May 19, 1947. One specimen captured in flight, June 4, 1947.

Glyptotendipes lobiferus (Say)

Trapped in cages (14): earliest emergence—May 22, latest emergence—Aug. 28, maximum emergence (2)—June 9, and Aug. 28, 1947. (fig. 4H).

Harnischia potamogeti Townes

Trapped in cages: May 16—June 28, 1947.

Harnischia tenuicaudata (Malloch)

Two specimens trapped in cages: May 22 and July 11, 1947.

Harnischia viridulus (L.)

One specimen trapped in cage 1, May 27, 1947 (deposited in collection of Dr. H. Townes).

Orthocladiinae

Cricotopus trifasciatus Panzer

Trapped in cages (77): earliest emergence—May 6, latest emergence—Oct. 18, maximum emergence (6)—July 3, and (6)—Oct. 1, 1947. (fig. 4I).

Spaniotoma lucida Staeg.

Trapped in cages and in flight: Apr. 24, May 16, 27, July 10, 1947.

Ceratopogonidae

(genera as in Johannsen, 1943)

Sphaeromias longipennis L.

Trapped in cages (34): earliest emergence—July 2, latest emergence—Aug. 4, maximum emergence (6, 6): July 15, 17, 1947. (fig. 4J).

Probezzia glabra Coq.

Trapped in cages (53): earliest emergence—July 12, latest emergence—Aug. 30, maximum emergence (14)—Aug. 13, 1947. (fig. 4K).

Acknowledgments

The writer is grateful to Professor A. E. Warren, in charge of the Marsh Research Project of McMaster University, for advice and encouragement during the course of this work. I wish also to express my thanks to the staff of the Marsh Research Project who have co-operated in the work, and especially to Miss Mary Inksetter who aided daily during the summer of 1947 in collecting

insects and in recording data. I am deeply obliged to the following specialists in the taxonomy of various groups for their kindness in making and checking the identifications of insects: Dr. H. B. Mills, Chief, Illinois Natural History Survey, Urbana, Illinois (Collembola); Dr. W. E. Ricker, Indiana University (Plecoptera); Dr. F. P. Ide, University of Toronto and Dr. H. T. Spieth, City College of New York (Ephemerida); Professor E. M. Walker, University of Toronto (Odonata); Dr. H. H. Ross, Illinois Natural History Survey, Urbana, Illinois (Trichoptera); Dr. W. T. M. Forbes, Cornell University (Lepidoptera); Dr. A. A. Granovsky, University of Minnesota (Aphidae); Dr. E. A. Chapin and Dr. H. S. Barber, U.S. National Museum (Coleoptera); Dr. C. P. Alexander, University of Massachusetts (Tipulidae); Dr. H. K. Townes, U.S. Department of Agriculture and Dr. J. G. Rempel, University of Saskatchewan (Tendipedidae and Ceratopogonidae).

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The Correction of a Genotypic Citation for the Genus *Choristoneura* Led.

It has been brought to my attention by G. E. Bucher, that in my note on the generic assignment of the spruce budworm *Choristoneura fumiferana* Clem. (Can. Ent. LXXIX: 21, 1947) I cited the genotype as *Tortrix rusticana* Treit. This citation is a *laps. cal.* for *Tortrix diversana* Hbn., the correct genotype as contained in my original manuscript.

T. N. Freeman.

Fleas in the Collection of the Royal Ontario Museum of Zoology

By C. Andresen Hubbard
Vanport College, Portland, Oregon

Early in March of 1948 I was asked by a member of the staff of the Royal Ontario Museum of Zoology, Toronto 5, Canada to identify the fleas in their collection. Never having worked fleas east of the Rocky Mountains or to any extent in British Columbia I suggested that the collection be sent to a Canadian specialist or to Dr. Karl Jordan of the British Museum. I was not in the least displeased, however, when on the first of April a packet containing the collection arrived at my home in Tigard, Oregon.

The collection was made up of an even 100 fleas mounted haphazardly on 50 slides from 11 Ontario hosts, ten of them rodents, the eleventh labeled Falco. It took only minutes to identify the eleven species of fleas and as one would suspect when one looks at a map of North America and sees that Ontario extends eastwards from the west boundary of Minnesota to the eastern boundary of New York the majority were common northeastern forms.

Two of the species called for additional study, neither having been reported east of the Rocky Mountains, but each having subspecies in the west. The first of these quite distinct from the western forms is here designated as new and shall be called

Peromyscopsylla hamifer markworthi
a new subspecies

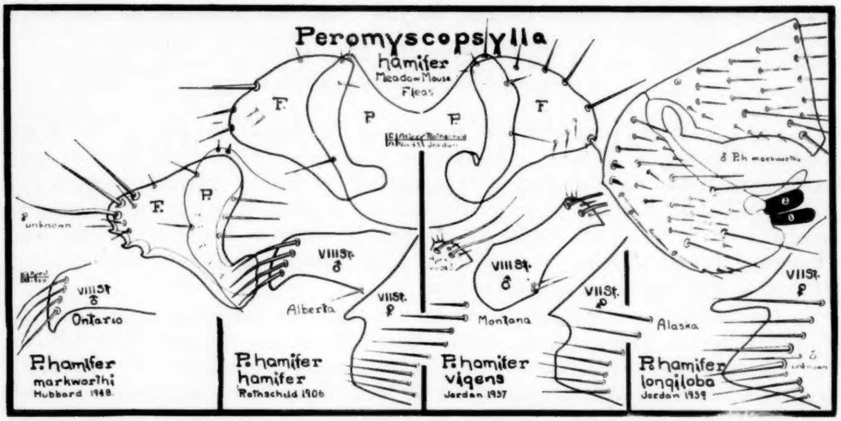
There is before the writer at this time but a single male, the holotype, the original data being: Host, *Microtus pennsylvanicus*; Smoky Falls (near Kapuskasing) Ontario; 7-XI-1938; R. V. Whelan.

The VIII st. of this male is similar to that of *P. h. hamifer* described by Rothschild in 1906 from materials taken off a weasel from Alberta, Canada, in that the posterior border is hooked to the ventral and armed posteriorly with 4 stout bristles. The process on the other hand, is suggestive of *P. h. vigens* described by Jordan in 1937 from materials off *Microtus* taken in Montana, in that the posterior border is deeply notched at two positions, each notch bearing a bristle. The finger of the new subspecies is distinct. Observed from the lateral aspect the finger is almost bisymmetrical in apical outline, the anterior apical angle being as rounded as the posterior. The undercut face of the anterior border is armed with three well defined bristles. The apical border is practically flat. The rounded border of the posterior apical angle is cut below by three deep notches which resemble saw teeth. Above these on the apical border are three strong bristles, the posterior one wavy, each with a strong socket. Five weak bristles are on this portion of the finger.

Nothing is known about the range of the new subspecies. The male is large, measuring about 3.5 mm. in length. The type is being returned to the Royal Ontario Museum.

This flea bears the name of Mark Worth Hubbard, infant son of the writer whose six month old birthday fell upon the day this flea was examined and described; and is the 24th North American flea described by the author.

The second of the species newly collected from Eastern Canada and not so far mentioned from the eastern United States is *Monopsyllus eumolpi*. A careful check of 20 specimens with the western subspecies *M.e. eumolpi* Roths, which the writer has from many parts of all states west of the Rocky Mountains leads



him to believe the Ontario specimens are the same even though there are no published records of this flea in the thousand miles of territory between the ranges.

The eleven fleas found in the collection are *Orchopeas leucopus* Bak. (Deer Mouse Flea), *Orchopeas howardi* Bak. (Squirrel Flea), *Oropsylla arctomys* Bak. (Marmot Flea), *Megabothris quirini* Roths. (Mouse Flea), *Monopsyllus eumolpi eumolpi* Roths. (Chipmunk Flea), *Monopsyllus vison* Bak. (Red Squirrel Flea), *Ceratophyllus swansoni* Liu (Bird Flea), *Epitedia wenmanni* Roths. (Mouse Flea), *Peromyscopsylla hamifer markworthi* Hub. (Mouse Flea), *Ctenophthalmus pseudagyrtes* Bak. (Vicarious), and *Doratopsylla curvata curvata* Roths. (Shrew Flea).

Host Index, Localities and Dates

Peromyscus maniculatus (Deer Mouse): *O. leucopus*, Smoky Falls near Kapuskasing, 29-III-1934 by R. V. Whelan; *E. wenmanni*, Nakina in Thunder Bay District, 6-VI-1947 by W. Watson; *O. leucopus*, Sioux Lookout in Kenora District, 1-VII-1947 by W. Watson; *O. leucopus*, *C. pseudagyrtes*, Malachi in Kenora District, 15-22-VII-1947 by W. Watson.

Microtus pennsylvanicus (Meadow Mouse): *P. h. markworthi*, Smoky Falls, 7-XI-1938 by R. V. Whelan; *C. pseudogyrtes*, Sioux Lookout, 4-VII-1947 by W. Watson.

Clethrionomys gapperi (Redback Mouse): *M. quirini*, Sioux Lookout, 4-VII- by W. Watson.

Zapus hudsonicus (Jumping Mouse): *M. quirini*, Sioux Lookout, 28-VI-1947 by W. Waston.

Eutamias minimus (Chipmunk): *M.e. eumolpi*, Nakina, Sioux Lookout; *C. pseudagyrtes*, Sioux Lookout, 5-30-VI-1947 by W. Watson.

Tamias striatus (Chipmunk): *M.e. eumolpi*, Nakina, 7-VI-1947, Malachi, 19-VII-1947 by W. Watson.

Tamiasciurus hudsonicus (Red Squirrel): *M. vison*, Sioux Lookout; *O. howardi*, Sioux Lookout, Nakina; *M.e. eumolpi*, Malachi; *M. quirini*, Nakina, all collected by W. Watson between June 5 and July 16, 1947.

Sciurus (Gray Squirrel): *O. howardi*, Toronto, 2-V-1945.

Marmota (Ground Hog): *O. arctomys*, Nakina, 13-VI-1947 by W. Watson.

Blarina brevicouda (Shrew): *D.c. curvata*, Sioux Lookout; *C. pseudagyrtes*, Nakina and Sioux Lookout by W. Watson between June 24 and July 4, 1947.

Falco columbarius (Hawk): *C. swansoni*, no locality, 27-VI-1947 by C. Hope.

A New *Formica* from Northern Maine, with a Discussion of its Supposed Type of Social Parasitism (Hymenoptera: Formicidae)[1]

By M. W. Wing
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While on a short visit in northern Maine during the summer of 1946, I collected a new and interesting ant of the Microgyna group of the genus *Formica*. The description follows below:

Formica dirksi sp. nov.

Deälate queen, total length 5.1 mm. Head, maximum width through eyes 1.2 mm., at base of mandibles 0.78 mm., length to anterior border of clypeus 1.3 mm. Thorax, Weber's (1938:155, footnote) measurement 2.1 mm. General characters of the Microgyna group. Mandibles 7-toothed. Clypeus evenly rounded in front, with uneven surface and carina just barely distinguishable as a line anteriorly, but becoming a low blunt ridge through the mid-region and disappearing posteriorly. Head, excluding mandibles and eyes, somewhat longer than broad; narrower in front than in behind, with posterior corners evenly rounded, posterior border and sides slightly convex. Antennae of medium size, scape slightly stouter apically than basally, bent slightly and gradually in basal half, joints 2 and 3 of funiculus distinctly longer than broad; the apical joints only slightly longer than broad. Frontal area distinct, subtriangular, and about twice as broad at base as high. Frontal carinae diverging posteriorly, about as long as width of frontal area. Eyes black, more or less oval, strongly convex, remote from mandibular insertions and close to posterior corners of head. Ocelli medium-sized, round, white and forming an isosceles triangle with a base, which is situated posteriorly, equal to 0.24 mm. Ratio of base to the shorter sides is 10 to 7. Maxillary palpi long and slender, antepenultimate joint longest (0.23 mm.), penultimate joint shortest (0.11 mm.) and terminal joint exclusive of hairs intermediate in length (0.15 mm.). The ratio of the lengths of these three segments taken in the order given above is about 30:15:20. Thorax narrower than head, the prothorax distinctly narrower, the mesothorax only slightly so, measuring 1.0 mm. just before the point of insertion of the fore wings. In profile thorax appears strongly convex. Pronotum, shallowly concave anteriorly, convex posteriorly; promesonotal constriction distinct. Scutum rising sharply from promesonotal constriction, strongly convex anteriorly, but only moderately so posteriorly. Prescutum represented dorsally by only a furrow. Scutellum in profile very slightly convex; metanotum more or less flat. The constrictions between scutellum and metanotum and between metanotum and epinotum distinct. Epinotum convex anteriorly, but sloping down to base of petiolar scale as a straight line when viewed in profile. Petiole stout, both its anterior and posterior surfaces convex, upper border blunt and evenly rounded. Small postero-laterally directed lobes located ventrally at point of juncture with gaster. As viewed from in front, petiole is narrow below and broadest about midway from base to upper edge. Gaster in profile appearing flat anteriorly, evenly and strongly arched above and moderately convex below.

Body opaque, finely and densely shagreened. Clypeus and cheeks subopaque and more sparsely shagreened. Mandibles subopaque, striate and with piligerous punctures. Frontal area smooth and shining.

[1]I wish to express my thanks to Dr. M. R. Smith of the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture for his many kindnesses to me on my recent (September, 1948) trip to Washington, D.C. Dr. Smith offered several suggestions on the preliminary manuscript which helped to improve it. I wish to thank Dr. T. B. Mitchell and Miss Doris Sharpe of this institution for their kindness in reading the preliminary manuscript and making several suggestions as to its improvement. Thanks are also due Prof. C. O. Dirks of the University of Maine for his kindness in placing the facilities of his laboratory at my disposal for the period of my stay in Maine. I wish also to thank my wife for her kindness in typing the final manuscript.

Body and appendages, exclusive of antennal funiculi, covered rather densely with long, more or less uneven yellowish hairs, those of the thoracic dorsum being mostly spatulate and erect, while the others are largely simple and suberect. These hairs are especially numerous and long on the anterior and posterior surfaces of the head, the thoracic dorsum, the petiole, the gaster and the legs. On the cheeks these hairs are shorter, more delicate and very few in number, as the longer hairs stop rather abruptly at the lower level of the eyes. Hairs numerous on maxillary palpi. There are a few long hairs basally, but otherwise the hairs are short, yellowish and suberect. The hairs of the terminal segment extend apically so as to give this segment the appearance of being somewhat longer than it actually is. Hairs on scape less numerous than on the legs, simple, very delicate, suberect, yellowish and of uneven length. The hairs of the antennal funiculus are very short, distinctly yellow, not very numerous and mostly appressed. The eyes are sparsely covered with short, delicate, yellowish, erect hairs. Entire body and appendages covered with a fine, closely-appressed pubescence, which is most noticeable on the gaster where it is very dense and rather silvery in appearance. Elsewhere the pubescence is of a yellowish color. Pubescence is more or less lacking on the under side of the head and on the cheeks.

Head, antennal scapes, most of thorax, petiolar scale and legs all a dull yellowish to reddish brown. Mandibular teeth, antennal funiculi, maxillary palpi, vertex, scutum, scutellum and metanotum deeply and heavily infuscated. Cheeks, sides of prothorax and base of petiolar scale more yellowish and lighter than the legs. Gaster deep blackish brown throughout.

Worker and *Male*: Unknown.

Dirksi runs to *microgyna microgyna* in Wheeler's Key to the females of this group (1913:395-396). It differs from the typical *microgyna*[2], to which it is closely related, in a number of characters of structure, pilosity and pubescence of which the following seems to be especially noteworthy: 1) Somewhat larger size. 2) Different relative lengths of the last two joints of the maxillary palpi; the last two joints are nearly equal in length in the typical *microgyna.* 3) Mandibles are 7-toothed; they are 8-toothed in the typical *microgyna.* 4) Superior border of petiolar scale lower and more blunt. 5) The presence of small postero-laterally directed lobes on the ventral part of the petiole where it joins the gaster; these are absent in the typical *microgyna.* 6) Hairs, much more numerous and slightly shorter; the hairs of the gaster are much fewer in number dorsally and nearly absent ventrally in the typical *microgyna.* 7) Pubescence on gaster longer, more dense, whiter and with a silvery tinge; the pubescence on the gaster has a yellowish tinge in the typical *microgyna.* 8) Distinctly darker in color, the areas of infuscation deeper and more extensive; the gaster lacking any light areas.

Further collecting and study may well show that the above-listed eight diagnostic characters are not the best for separating *dirksi* from the typical *microgyna.* It would seem that until more is known about the Microgyna group in general and about these two species in particular, it will be impossible to avoid the use of at least some characters which are so variable as to be of little diagnostic value. The rather numerous measurements scattered throughout the description represent an attempt on my part to have made at least a few significant measurements.

[2]Comparisons were made between *dirski* and the female cotypes 5 to 7 (No. 22720) of the typical *microgyna* in the Wheeler Collection in the M.C.Z. during early September, 1946. I wish to express my thanks to Dr. J. C. Bequaert, Head Curator of Recent Insects in the M.C.Z., for his many kindnesses to me during that brief visit.

Holotype, deälate queen, bearing the data: Daigle (Aroostook Co.), Maine, August 31, 1946 (M. W. Wing) Colony Number 241-46, in the U.S. National Museum collection (Type No. 58955).

I take pleasure in naming this species for my good friend and former teacher, Prof. C. O. Dirks of the University of Maine.

The colony from which this queen was taken was located at the edge of a small clearing in mixed woods (predominantly coniferous) near the main road from Fort Kent to Presque Isle (U.S. Route Number 161). The colony of *Formica fusca subaenescens* Em.[3], which harbored this queen, was located under the loose bark and in the wood of a large, erect, partially decayed, dry stump. The galleries of the nest were more or less filled with detritus, which was also apparent externally around the base of the stump. The location of the nest was such that it got the rays of the afternoon sun. The colony was very populous, consisting of several hundred workers and a large number of pupae, most of which were naked. I did not collect the nest queen, but this does not necessarily mean that she was not present in the nest, since I made the collection rather hurriedly and did not search for her carefully. At the time of the collection, which was made with an aspirator, I was completely unaware of the presence of the parasitic queen; she was not discovered until later in the laboratory at the University of Maine. Otherwise I would have made a more careful examination of the nest at the time.

Discussion

As is so often the case in the captures made in this group, there is too little information at hand to infer with any certainty and preciseness the type of parasitic relationship between the two forms. This is especially true in the present case, since the worker caste is unknown. Wheeler (1933:156) in his outline of the methods of colony founding among ants, lists the Microgyna group under the Conciliatory Type of Temporary Social Parasitism. This allocation is presumably due, at least in part, to the fact that *Formica difficilis* var. *consocians* Wheeler, one of the few species of the Microgyna group about which we know anything concerning its method of colony founding, is taken to be more or less typical of the group in general. In this method of colony foundation, the parasitic queen, after impregnation, seeks out and invades a nest of the host species, usually a small and depauperate colony. In successful cases this parasitic queen is adopted by the workers, presumably after she has acquired the brood- and nest-odor. Some time after the acceptance of the parasitic queen, the host queen disappears, but as to just how this event takes place we are ignorant. The demise of the host queen leaves the parasite with a clear field. The host workers rear her successive broods for as long as they live, and upon their death, a pure colony of the parasitic species occurs, which gives no indication of its questionable origin. In cases of Temporary Social Parasitism, incipient mixed colonies are seldom found. Pure colonies of species in the Microgyna group are to be found, but they are rare and sporadic in their distribution, which is, of course, delimited by the availability of suitable hosts. These hosts all belong, so far as we know, to the genus *Formica*; they are recorded from the Fusca group (subgenus *Formica*), the subgenus *Neoformica* and the subgenus *Proformica*. These ants are all cowardly and hence more approachable than the more aggressive

[3]It is often a problem to know just what name to assign many of the infraspecific forms of *Formica fusca*, as they represent a highly variable and difficult complex. In this case I am referring the host ant in question to *subaenescens* Em., since my specimens agree more closely with the specimens determined as *subaenescens* in the Wheeler Collection in the M.C.Z., than with any of the other infraspecific categories of *Formica fusca* in that collection.

species, and all fertile and therefore abundant. Despite these apparently favorable charcateristics of the host species, the type (or types) of colony foundation employed by the Microgyna group must be, to say the least, perilous, if we are to judge by the rarity of the nests and the sporadic nature of their distribution. This means that for the population to be maintained, the few successful colony founders of a given area must produce heavily in order to offset the losses entailed by the mass death of so many of the young queens of their species. This, in fact, is done, and probably quite readily, since the queens are so small that no doubt several of them can be produced on the amount of food that it would take to rear one of the bulkier queens found elsewhere in the genus.

If the risks of invading a small, depauperate colony are as great as the evidence presented above would indicate, then it would seem highly probable that entrance into a highly populous colony would mean almost certain death for the intruder, unless she were capable of rapidly overcoming the animosity of the host through means of behavior, odor, taste, touch, etc. There would seem to be little chance of such an invader safely slipping past the ubiquitous workers and reaching an unused corner of the nest, a pile of the brood, etc., where she could gradually acquire the nest- and brood-odor as is apparently the case with *consocians*. If the supposedly more risky invasion of large, populous colonies of the host species is the rule in *dirksi*, then it seems reasonable to suspect the possibility of a method of colony founding that differs somewhat from that found in *consocians*, and probably also from most of the other species of the Microgyna group[4]. Permanent Social Parasitism is such a possibility, since this type of parasitism would require a host colony sufficiently strong to rear the parasitic brood for several seasons thus assuring the necessarily heavy production of sexual forms so essential to the perpetuation of the parasitic species. In this connection it is assumed, of course, that the host queen does not remain in the nest, for otherwise a small colony would serve the interests of the parasitic queen as well as a larger colony, and furthermore without the presumably greater risks entailed by a populous colony. Dulosis, not reported up to now for any member of the Microgyna group, is assumed to be absent, if only on the basis that again a small colony would be adequate for a dulotic species. The type of colony founding here assumed as possible on the basis of very scanty evidence would, if it exists, be of the *Epimyrma gösswaldi* type (Wheeler, 1933:157). To date no bonafide cases of Permanent Social Parasitism have been reported in the genus *Formica*. However, Buren (1942:401-402) has cited evidence indicating the possibility that *Formica reflexa* Buren may be such a parasite.

The above speculations represent a type of armchair philosophy, which it is sometimes difficult to resist, especially if one happens to be in an armchair. In actuality, only the collection in the field of more information coupled with experimentation on colonies in artificial nests will give us the necessary facts for elucidating the life history of this parasite. *Dirksi* represents the twenty-sixth described form of the Microgyna group in the Nearctic region. Smith (1947:623) lists the other twenty-five forms[5] and points out that very little is known about them biologically. This is not only true for the Microgyna group of the genus *Formica*, but also for many of the other North American ant forms, which number approximately 750. Myrmecology is a field which is in need of the efforts of capable and serious students, and a field which has a great deal to offer

[4]The tacit assumption upon which this statement is based is what might be termed the principle of least risk and least energy expenditure concomitant with individual, and hence ultimately racial, success, which naturalists generally have come to expect of an exquisitely balanced and an infinitely complex nature.

[5]Recently A. C. Cole (1942) has synonymized both *difficilis* var. *consocians* Wheeler and *habrogyna* Cole under *difficilis* Emery. If Cole's synonymies are accepted, then the Smith list is reduced to 23 forms. Cole was apparently justified in this procedure, for these forms were based largely on pilosity, which varies greatly even within a colony series. It is probable that when a serious revisionary study is made of the Microgyna group a number of forms will be relegated to synonymy.

such students, particularly those interested in biological investigations. It is hoped that this paper by calling attention to the opportunities for original myrmecological investigations may attract one or more workers to the field. Any interested individual might do well to read Dr. M. R. Smith's (1947) most excellent summary of the taxonomy and biology of our North American ants, if he wishes to gain a clearer insight into the multifarious unsolved problems of Myrmecology.

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Variation in Taxonomic Characters of Some Simuliidae (Diptera)*

By D. M. Davies

In examining a long series of several species of blackflies collected in Algonquin Park, Ontario, it was found that characters, often key characters, used in identifying adults as well as pupae showed variations from those described by previous authors.

Prosimulium hirtipes (Fries)

Table 1

Frequency distribution of different arrangements of teeth on the claspers of P. hirtipes.

Left Clasper	Right Clasper	Percentage
3	3	4
2	3	11
3	2	16
2	2	69
		Total 100

Adult: The teeth of the male clasper were studied in one hundred specimens of this species collected on May 21, 1943 from Costello creek and their frequency distribution is shown in Table 1. The most common condition is 2 + 2 teeth whereas 3 + 3 is quite uncommon. One specimen had 3 + 5 teeth but this condition is rare and did not occur in the 100 specimens shown in Table 1. Edwards (2) described 2 + 2 as the type, with 2 + 3 abnormal. Dyar and Shannon (1) gave 2 + 2. However, Twinn (8) found 2 + 3 teeth on the claspers of his specimens.

The antennae usually have eleven segments but 9- and 10-segmented antennae were found. This condition was studied in 147 flies collected from May 19-22, 1940. The frequency distribution of adults with different numbers of segments in their antennae is displayed in Table 2.

Table 2

Frequency distribution of adults of P. hirtipes *with different number of segments in their antennae.*

Number of segments	Number of Males	Number of Females
11	18	111
10	16	1
9	1	0

A fusion of the last two, or in the case of the 9-segmented form the last three, distal segments caused the reduction in number. Grooves indicated where the fusion had occurred and two segments were counted as one when fusion extended more than halfway around the antenna.

*Contribution of the Department of Zoology, University of Toronto and the Department of Parasitology, Ontario Research Foundation.

TABLE 3

Frequency of pupae of P. HIRTIPES *with different arrangements of filament branches, based on 204 specimens.*

Arrangement of branches	11+14	13+13	13+14	13+15	14+14	14+15	14+16	15+15	15+16	15+17	16+16
Number of pupae	1	4	3	1	43	14	1	11	7	1	118

Pupa: The pupal filaments varied from 11-17 (Table 3) and the number on one side often differed from that on the other. It is seen also (Table 3) that as the difference in the number of branches between the two sides increased, the frequency of occurrence decreased.

TABLE 4

Frequency of different types of filament branching in P. HIRTIPES *based on 408 pupal filaments.*

Number of branches per side	11	12	13	14	15	16	17
Frequency	1	0	12	105	45	244	1

If we treat each respiratory tuft separately, we obtain the data in Table 4. It is readily seen in this table that the most common number of branches for this species is 16, but a surprising number have 14 branches. This might be confusing as *Prosimulium browni* Twinn has 14 pupal filament branches.

Considerable confusion exists as to the number of pupal filaments in this species. *P. hirtipes* from Eastern Canada, as described by Twinn (8), has but 16 pupal filaments, agreeing with the type material collected by Fries in the Scandinavian Lapland. Johannsen (3, 4), Malloch (5), and others have indicated up to 60 or more respiratory filaments in the North American species; Puri (6) found 50-60 respiratory filaments on the pupae of *P. hirtipes* in France but only 16 on those from Norway. Consequently it may be found by further study that the forms with 50 or more filaments may be different species.

Cnephia lascivum (Twinn)

Adult: A single specimen, from several hundred of this species examined from Costello creek had 1 + 2 teeth on the claspers. Typically 1 + 1 teeth were found which confirms the observations of Twinn (8).

Twinn in his original description of both males and females, states, "radial sector weakly furcate". However, Smart (7) in his revision of the classification of the world blackflies places *lascivum* in the genus *Cnephia*. For this genus he makes the following statement in regard to the forking of the radial sector, "unbranched but, sometimes, with tip swollen where it joins the costa". Specimens examined in the present study showed a graded series from no forking to distinct forking. When looking for this branching critically, only in two cases was swelling at the tip indistinct in those with no fork. In seventeen flies examined seven showed a distinct fork, six showed a diffuse, short and indistinct fork, and four (all males) showed no fork (two with swelling).

Cnephia mutatum (Malloch)

Pupa: One pupa of several collected in the present study, had 11 + 12

filament branches. However, typically, the pupae had 12 + 12 filament branches, which was similar to the condition found by Twinn (8) but he indicated also that there were sometimes 13 or 14 branches.

Simulium vittatum Zetterstedt

Adult: A few males of this species had 3 + 4 and even 4 + 4 teeth on the claspers but over 90% of those examined had 3 + 3 teeth. This is in agreement with the finding of Dyar and Shannon (1) and Twinn (8) who indicate 3 + 3 teeth as typical.

Pupa: Pupae were found in Costello creek on July 11, 1946 in which each side had 14 and others in which each side had 15 filament branches. In one male pupa there were 15 + 16 and in another 14 +15 branches, but most of the pupae had 16 + 16. There was considerable variation in the position of the branching. Some stalks branched near the base, others near the extremity; in still others the branching was completely lacking on a stalk, which gave rise to the reduced number of filament branches. Twinn (8) and Johannsen (4) say that the usual number of pupal filament branches is 16. However, Malloch (5) states, "occasionally there are only 15, instead of 16".

Simulium ottawaense Twinn

Adult: The adult male adminiculum was described by Twinn (8) as having "a rounded, setulose posterior process or keel". In *S. corbis* Twinn the adminiculum was described as having "a flat, apically rounded process or keel, sparsely and minutely setulose on the sides and marginally denticulate". The presence or absence of these denticles was a key character in the separation of the two species. The pupae were separated by the number of pupal filament branches, *S. ottawaense* having 8, *S. corbis* 10. All pupae examined from Algonquin Park, including a series of 163 in 1946, showed 8 filament branches and none 10. However, all the adminicula examined had denticulate keels. In order to clarify this point adult adminicula were dissected from pupae with 8-branched filaments. These also showed the teeth on the keel. In looking at the slides of Twinn's type material teeth were observed on at least one specimen of *S. ottawaense*.

It appears from the above study that the keels of both *S. ottawaense* and *S. corbis* are denticulate and that this character is not valid in separating the two species. However, these two species can be separated by the other characters in Twinn's descriptions.

A definite small tooth was present on the claws of females of *S. corbis*, as described by Twinn (8). However, confusion might arise in separating it from *S. ottawaense* by the appearance of the claw tooth alone because in the latter species some claws were found with a weakly developed tooth though in no instance were teeth as distinct as in Twinn's type specimens of *S. corbis*.

Summary

These analyses showed that there was a considerable variation in the number of teeth on the claspers of *P. hirtipes*, *C. lascivum*, and *S. vittatum*; in the branching of the radial sector in *C. lascivum* and in the number of pupal filament branches in *P. hirtipes*, *C. mutatum* and *S. vittatum*. The frequency of these variations is indicated in most cases. It was found also that the keel of the adminiculum in both *S. corbis* and *S. ottawaense* was denticulate whereas previously this condition was described as such, only in the former.

I am grateful to the University of Toronto for giving me the opportunity for this work and especially to Professor F. P. Ide, Department of Zoology, under whose direction the work was carried out. I am indebted to Dr. H. B.

Speakman, Director of the Ontario Research Foundation, for providing the means and facilities to accomplish this research and I wish to thank Dr. A. M. Fallis, Director of the Department of Parasitology, Ontario Research Foundation, for his helpful advice.

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New North American Larvaevorine Flies (Diptera, Larvaevoridae)*

By A. R. Brooks,
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During the course of revisional studies of the tribe Larvaevorini, a number of undescribed species were received from outside sources. Rather than delay the return of specimens, and on the chance that the final revision will not be published for some time, the descriptions of these new forms are given below.

Juriniopsis aurifrons new species

Until the present only one species of *Juriniopsis, adusta* Wulp. (*floridensis* Tns.) has been recognized from the United States. The new species, which ranges in Arizona, New Mexico and Utah differs from *adusta* Wulp. in the following characters: female front tarsus slender (widened and flattened in *adusta*); male vertex 0.35 head width (0.27 head width in *adusta*); parafrontals subshining yellowish with yellowish or brownish-yellow pollen (subshining bluish-grey with greyish or yellowish-grey pollen in *adusta*), and in the structure of the genitalia.

Male. Length 13-16 mm. Vertex 0.34-0.37 head width. Frontalia reddish, lightly pollinose; first and second antennal segments brown, the third segment black except basally and below; parafrontal yellow, yellow or yellowish-brown pollinose; parafacial, clypeus, cheek and occiput grey pollinose, the cheek groove yellowish; occipital hair yellowish; palpi reddish-yellow.

Thorax mostly black, the lateral line, prescutellar area and scutellum dark reddish; mesonotum lightly greyish-yellow pollinose in front of the suture with four narrow vittae. Wing slightly darkened, the basal fourth, alula and r-m crossvein black; veins brown; epaulet brown; squama and squamula black. Legs black to dark brown; pulvilli yellow.

*Contribution No. 2576, Division of Entomology, Science Service, Department of Agriculture, Ottawa.

Abdomen dark chestnut, the depression of the first segment and a narrow triangular vitta on segment two black; abdomen without pollen; abdominal hair erect medianly, short, dense, black. Accessory process large and pincherlike at the apex, the fingers of the pincher separated by a broad U-shaped cleft, the ventral finger longer than the dorsal; forceps deeply cleft at the tip, the apical divided portion about as long as the basal part.

Female. Vertex 0.38-0.40 head width. Colored as in the male. Front tarsus slender as in the male or very slightly widened.

Holotype. ♂, Hell Canyon (Manzano Natl. Forest), New Mexico, 7,200 ft., Oct. 19, 1916 (C. H. T. Townsend); in the United States National Museum, Washington.

Allotype. ♀, as holotype, Oct. 13, 1916 (Townsend).

Paratypes. Arizona: 8 ♂, 9 ♀, Oak Creek Canyon, Aug. (F. H. Snow). 5 ♂, Indian Cr. Canyon, Chiricahua Mts. 1 ♂, 1 ♀, Yavapgi Pt., Grand Canyon, July 29, 1943 (L. Schellbock). 1 ♀, South Rim, Grand Canyon, Aug. 30, 1942 (L. Schellbock). 2 ♀, East Verde River, 4,500 ft. *New Mexico*: 3 ♂, Jamez Springs Mts., July and Aug. 4 ♂, 9 ♀, Hell Canyon, Oct. 13, 14, 18 (C. H. T. Townsend). 2 ♂, New Mexico (Faumer).

Argentoepalpus rufipes new species

This species differs from the common *signiferus* (Wlk.) in the smaller size, wholly reddish legs, the light, almost subshining nature of the thoracic pollen, the shining pollen and different conformation of the abdominal markings, and the deeper emargination of the male forceps.

Male. Length 7-9 mm. Vertex 0.29-0.30 head width. Frontalia reddish-yellow; first and second antennal segments reddish-yellow, the third black except basally; parafrontal and parafacial yellowish-grey to brownish-grey pollinose, the cheek and occiput grey pollinose; parafrontal, parafacial and cheek hair black, dense, long and fine; occipital hair white.

Thorax black, the scutellum reddish; mesonotum lightly covered with thin brownish pollen; the vittae hardly distinguishable. Wing clear to slightly fumose; veins yellow; epaulet reddish-yellow; squama light yellowish-brown, squamula white. Legs except coxae entirely reddish-yellow, the hind femur often somewhat darkened at the extreme base.

Abdomen black, broadly reddish at the sides; median vitta of segments two and three and the anterior half of segment four covered with rather shining brownish-grey or yellowish-grey pollen, the pollen a little lighter anterolaterally (segment three often covered on anterior half centrally, or vitta may be obsolete); abdominal hair dense, erect. black; sternites black. Genital segments rather small; forceps a little convex, with emarginate tip, the prongs about half as long as the body of the forceps.

Female. Vertex 0.32-0.34 head width. In general colored as in the male but the head more yellowish or golden pollinose, the mesonotum with heavier pollen and distinct vittae and the abdomen usually not reddish at the sides.

Holotype. ♂, Robson, B.C., April 7, 1947 (H. R. Foxlee); No. 5771 in the Canadian National Collection, Ottawa.

Allotype. ♀, Robson, B.C., April 21, 1947 (H. R. Foxlee).

Paratypes. British Columbia. 5 ♂, 1 ♀, Robson, April 4, 6, 21, 22, 1947; April 2, 1939 and Sept. 14, 1940 (H. R. Foxlee). 1 ♂, 2 ♀, Victoria, April 20, 1926 (R. C. Treherne), June 7, 1920 and April 8, 1921. 2 ♀, Penticton, April

21, 1927 and May 4, 1927 (E. R. Buckell). 1 ♀, Oliver, April 23, 1927 (E. R. Buckell). 2 ♀, Agassiz, April 27, 1922 (R. Glendenning). 1 ♀, Royal Oak, June 18, 1917 (W. Downes). *California.* 2 ♂, 1 ♀, Fairfax, Marin Co., April 6, 1918 (J. C. Bridwell). 2 ♂, Walnut Creek, March (W. M. Davidson). *Washington.* 3 ♂, Electron, March 16, 1936 (W. W. Baker).

Archytas (Nemochaeta) convexiforceps new species

This species is very similar to *Archytas lateralis* Macq. in general appearance, keying to *lateralis* in Curran's key (Can. Ent., 60:202, 1928). It is at once distinguished from *lateralis* in the male by possessing convex or domelike forceps instead of concave or cuplike forceps.

Male. Length 11-12 mm. Vertex 0.28-0.29 head width. Frontalia yellowish to dark reddish posteriorly; antenna reddish-yellow, the third segment brownish on the upper half; parafrontal black, subshining, covered with very thin greyish pollen; parafacial, cheek and clypeus yellow with whitish pollen; parafacial hair black, sparse, coarser below; occipital hair white; palpi reddish-yellow. Third antennal segment twice as long as the second; first aristal segment as long as the second.

Thorax black, the scutellum brownish-black apically; thoracic hair entirely black; mesonotum subshining with very thin grey pollen and distinct vittae. Wings slightly and evenly darkened; veins yellow; epaulet reddish-yellow; squama and squamula white. Legs dark reddish-brown to black; pulvilli as long as the last tarsal segment, yellow.

Abdomen dark reddish, the depression of the first segment, an equibroad central vitta on segments two and three, and segment four dark brown or bluish-brown; abdomen without pollen. Body of forceps nearly round, convex, domelike, the anterior edge abruptly scooped out at right angles to the long spikelike tip; accessory process cleft, the upper prong three-fourths as long as the lower, somewhat inflated, oblong, light yellow in color, the lower prong broad and sicklelike; forceps with a row of moderately stout bristles around the margin, otherwise the hair short; fifth sternite with a broad U-shaped cleft, the tips of the lobes convergent, each furnished with a short, blunt medianly projecting process.

Female. Vertex 0.29-0.30 head width. Third antennal segment 1.5 times the second. Abdomen reddish, with a broad median vitta and posterior third of segment three purplish; segment four shining mahogany red. Otherwise colored as in the male.

Holotype. ♂, Miami, Florida, Nov. 11 (C. H. T. Townsend) in the United States National Museum, Washington.

Allotype. ♀, Miami, Florida, Nov. 21 (C. H. T. Townsend).

Paratypes. 1 ♂, 1 ♀, Miami, Florida, Nov. 17 and Nov. 18 (Townsend).

Peleteria (Sphyromyia) neotexensis new species

This species keys to *Peleteria townsendi* Cn. in Curran's key (Trans. Roy. Soc. Can. 19:225, 1925) by virtue of the footlike accessory process, but *townsendi* Cn. male has a much broader vertex with the pollen of the fourth abdominal segment and posterior edges of the other segments quite brownish in contrast to the grey of the rest of the abdomen, and the forceps longer and narrower with the apical portion less deeply excavate and the median lobe small and rounded. The species comes closest to *texensis* Cn. differing in the narrower vertex, footlike accessory process and shallower grooved forceps. The female

abdomen is more reddish than *texensis* with a dark triangle on the fourth segment.

Male. Length 10-11 mm. Vertex 0.30 head width. Frontalia yellow, reddish posteriorly; first and second antennal segments reddish-yellow, the third black except basally and below; parafrontal grey to reddish, brown posteriorly, the parafrontal, parafacial, cheek and clypeus with thin, shining whitish pollen; occipital ruff white; palpi wholly slender, 0.8 times as long as the haustellum, reddish-yellow.

Thorax black, the scutellum and posterior callus reddish; pollen thin, grey, the mesonotal vittae evident only in front of the suture. Wings slightly darkened; epaulet black; squamae white. Legs mostly black, the tibiae reddish-brown; pulvilli longer than the last tarsal segment.

Abdomen mostly reddish, the first segment, a broad dorsal line and the anterior three-fourths of the fourth segment black; abdominal pollen moderately heavy, uniform, entirely grey. Fifth sternite with a V-shaped cleft, the lobes fringed with long hairs medianly, stouter spines at the apex and a number of long hairlike bristles at the apical third behind the apex; accessory process nearly straight, footlike at the apex with rounded heel; forceps broad, a little wider at the apex with a broad, moderately deep groove from base to apex; apical portion deeply excavate with a prominent pointed median lobe which is conspicuous when forceps are viewed from above.

Female. Vertex 0.31-0.32 head width. Colored as in the male but the abdominal pollen tends to be thinner; fourth abdominal segment mostly reddish with a black median triangle; mid femur with two anterior bristles at the middle; front tarsus broad and flat.

Holotype. ♂, College Station, Texas, April 21, 1944 (H. J. Reinhard); No. 5773 in the Canadian National Collection, Ottawa.

Allotype. ♀, College Station, Texas, May 9.

Paratypes. Colorado. 2 ♂, 5 ♀, Platte Canyon, June 10, 1927 (J. M. Aldrich). *Texas.* 4 ♂, 5 ♀, College Station, April 21- May 10 (H. J. Reinhard).

The Colorado males have shallower-grooved forceps with a less prominent median lobe and are somewhat more reddish than the Texas males. The Colorado females also tend to be more reddish than those from Texas.

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